

User manual DinaSys DTC/DTS and DTC/DTZ

PiCommIT has developed the DinaSys DTC/DTS and DinaSys DTC/DTZ turntable controller for the Fleischmann / Marklin Turntables in scale H0, H0m, TT, N and Z. One of the most important starting point was that no major changes were to make to the turntable. The result was detection of the position of the bridge with magnetic sensors on the DTS and DTZ board. The mechanical adjustment of the turntable is limited to mounting a magnet under the bridge.

Apart from the easy installation, the DTC/DTS and DTC/DTZ has strongly improved features, like a smooth behaviour when turning. This is achieved by using pulse width modulation.

As a result of using pulse width modulation for driving the motor in the bridge, it is possible to make the behavior more realistic than with a standard control. The bridge starts slowly, then runs at normal speed until the target track is almost reached and finally slows down before coming to a halt.

Dinamo users have the great advantage that the turntable and all sidings use only two block outputs, even if you use all 47 sidings!

This manual describes the technical characteristics, the installation of the hardware and the software and the configuration with DTC-Config. The software described relates to version 3.16 or higher.



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Technical Aspects

The electronics for controlling the turntable consists of two boards, the DTC and DTS; For the Z-scale turntable the DTC is used with the DTZ. A mounting kit and cables completes the set.

DTC/DTS is currently supported by iTrain, Rocrail, WinDigipet and Train Controller.

Supported turntables are:

- Fleischmann 6052, 6152 (H0);
- Fleischmann 6154 (H0);
- Marklin 6652/7286 (H0);
- Fleischmann 6680 (TT and H0m);
- Fleischmann 9152 (N);
- Marklin 89982 (Z).

Also the "C" models can be used.

Content

A complete set of the turntable controller consists of:

- DinaSys DTC module (controller card) with software version 3;
- DinaSys DTS-assembly (sensor board);
- Brackets;
- Fasteners;
- Magnet;
- Power cable DTC/DTS;
- Data cable DTC/DTS;
- Connectors.

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Dinamo is a trademark of VPEB

iTrain is a trademark of Berros

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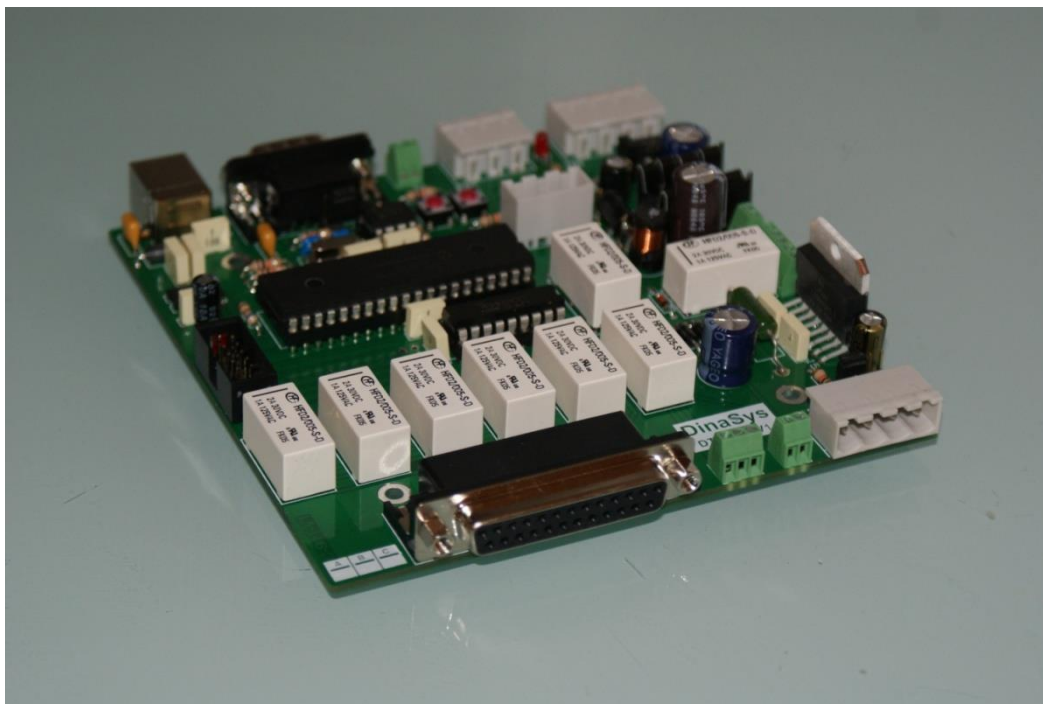
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DTC (DinaSys Turntable Controller)

This board contains all the electronics for controlling the turntable:

- USB interface for PC;
- CAN interface for accessories like the DTM manual controller and the DTR relay card;
- Data and power connections for the DTS or DTZ board;
- Power supply for the electronics;
- Relay for polarity reversal and locking the bridge;
- Pulse width modulation for the motor in the bridge;
- Relay for the power supply of six sidings (for block system like Dinamo);
- CPU for controlling the electronics.



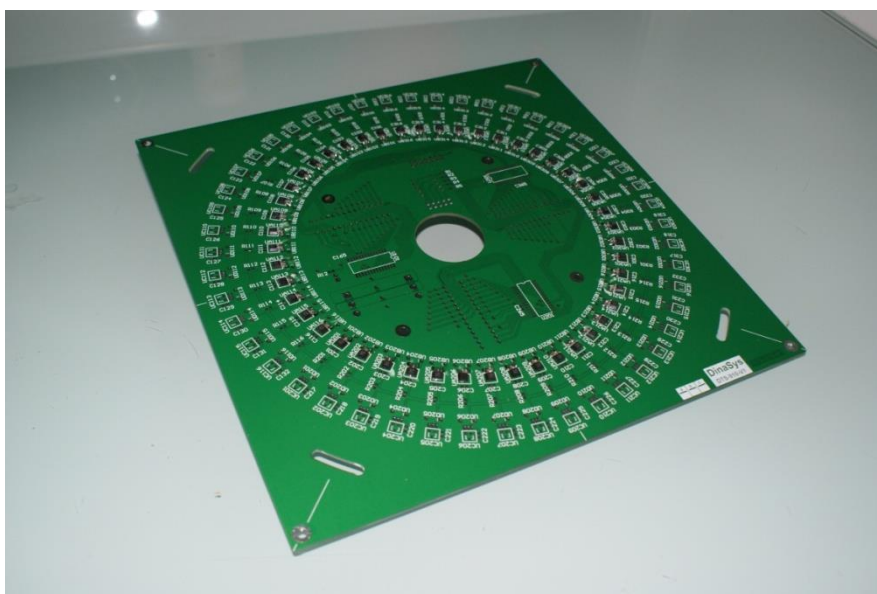
DTC module

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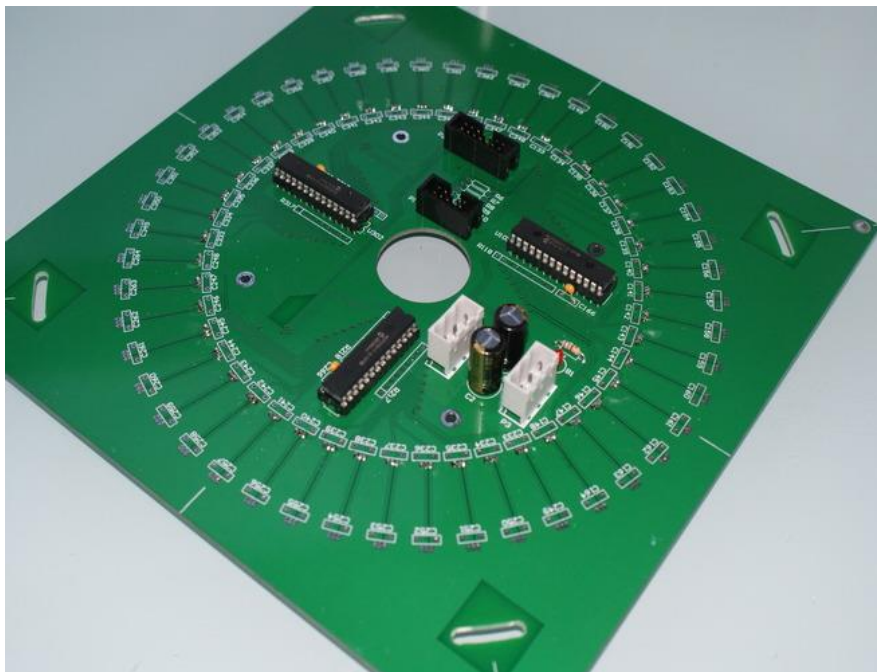
DTS (DinaSys Turntable Sensors)

This board contains the electronics to feedback the position of the bridge:

- 48 sensors;
- Data and power connector to the DTC module.



DTS module: 48 Sensors



DTS module: Elektronik and connectors



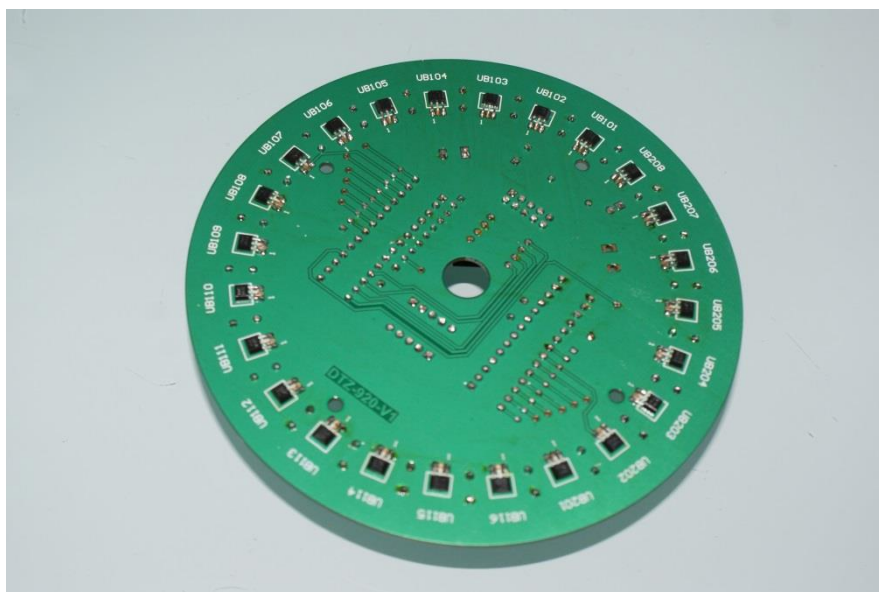
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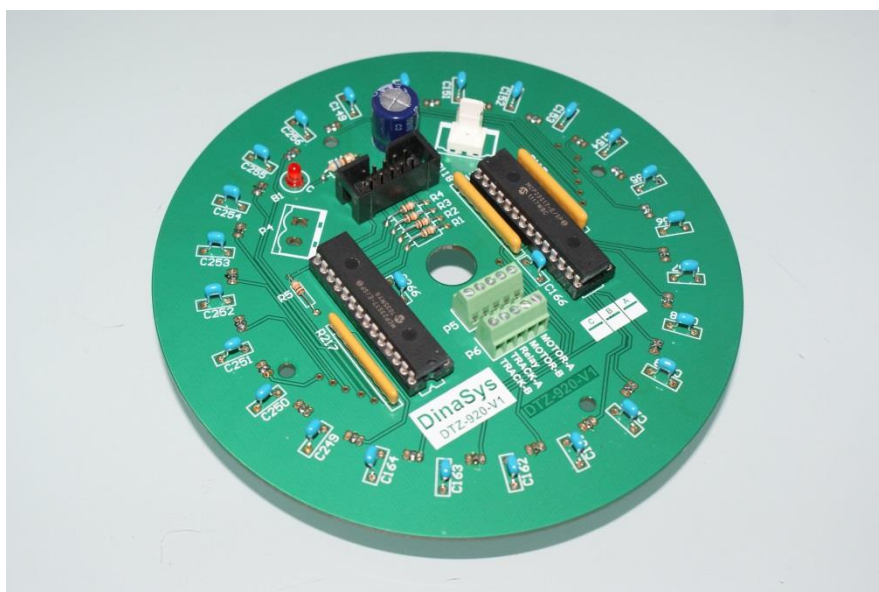
DTZ (DinaSys Turntable Z-Sensors)

This board contains the electronics to feedback the position of the bridge:

- 24 sensors;
- Data and power connector to the DTC module.



DTZ module: 24 Sensors



DTZ Module: Elektronik and connectors



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Mounting material

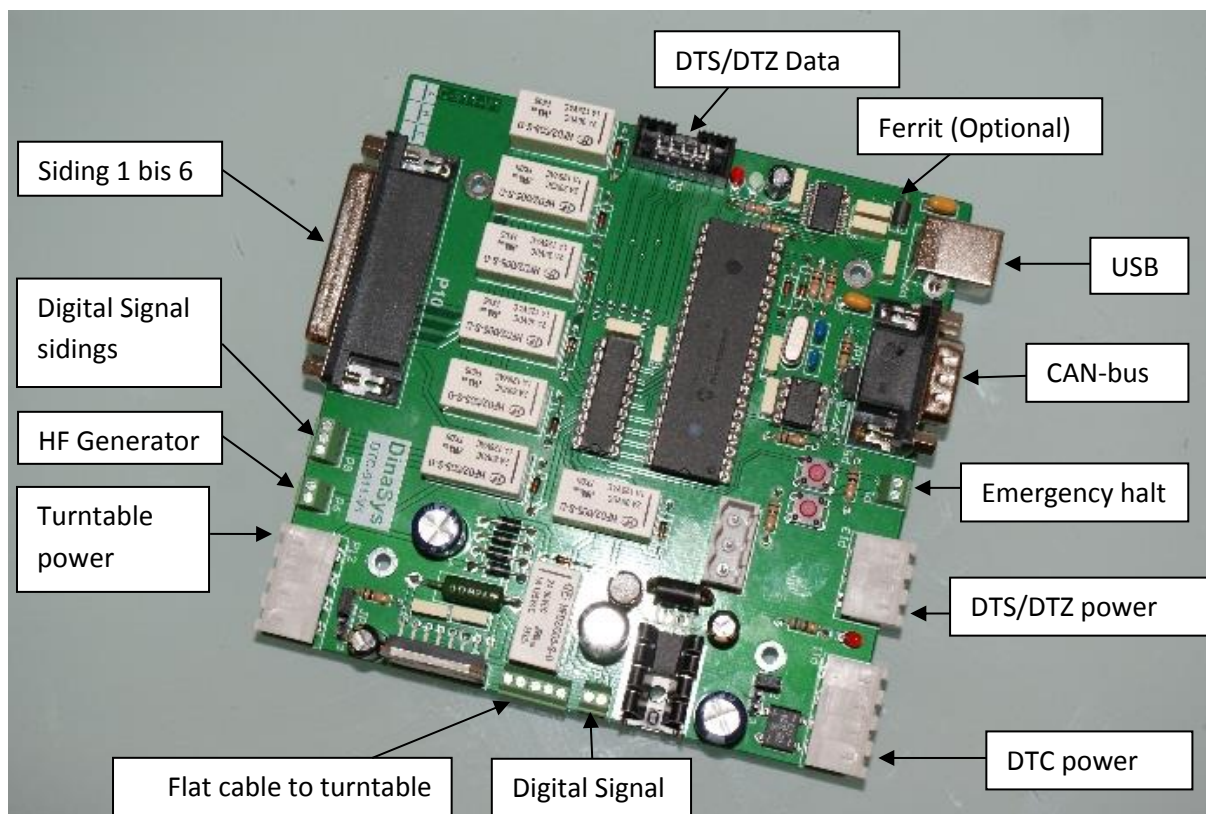
For the assembly of the DTS and DTZ board is a mounting kit available. This kit allows the the adjustment of the height and the positioning of the sensors straight under the magnet. The kit also includes this magnet for mounting under the bridge.

Cables

To connect the DTC with the DTS or DTZ the cable are included. It contains a flat cable for the data connection, a power cable, two connectors for the power connection on the DTC and a USB cable. The DTC can be connected to a PC with a USB cable of up to 7 meters, but we recommend to minimize the length.

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Connections DTC



Connections on DTC module

DTS/DTZ Data (P2)

With a 10 wire flat cable, the data connection is made with the DTS or DTZ.

USB (P7)

Connection for the PC.

CAN-bus (P5)

Used to connect a DTR (board with extra relays for block systems) or the DTM manual control.

Emergency halt (P1)

Here one can connect a push button, so that the turning of the bridge may be interrupted in case of an emergency. On the DTC is also a push button (S3) for the emergency halt.

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DTS/DTZ power (P13)

Power cable to DTS/DTZ module. The arrow in the picture points to pin 1.

- Pin 1 : +5V
- Pin 2 :
- Pin 3 : GND

DTC power (P11)

Connect a DC or AC voltage for the electronics on the DTC and DTS/DTZ. The board holds a voltage regulator for the electronics. AC or DC power can be connected to P11. The arrow in the picture points to pin 1.

AC power supply 12-16V (Jumper JP2 must connect pin 2-3)

- Pin 1 : AC
- Pin 2 : AC
- Pin 3 :
- Pin 4 : GND

DC power supply 14-16V (Jumper JP2 must connect pin 1-2)

- Pin 1 :
- Pin 2 :
- Pin 3 : Plus
- Pin 4 : Minus (GND)

The DTC can also be powered from the USB port of the PC. In this case, the ferrite must be mounted behind the USB-connector on the pcb.

Warning: Using both USB-power and power on P11 will damage the electronics and/or the PC!

Digital Signal for the bridge (P3)

Connect here the digital signal from the digital system or booster. In case of Dinamo connect an output of the TM44 block module.

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Turntable (P9)

For powering the motor and the locking mechanism in the bridge. The turntable is fitted with a flat cable with 5 wires (2-rail) or 6 wires (3-rail). In both cases there is one feedback used on the bridge.

2-rail turntable with 5 wires - terminals from left to right:

- Yellow : Motor
- Red : Common
- Gray : Locking mechanism
- Yellow : track power (rail - digital signal)
- Yellow : track power (rail - digital signal)

The “C”-type turntables have a relay for polarity in the bridge. In combination with the DTC the relay has no function and needs to be bridged. In the picture below you can see which pins need to be connected.

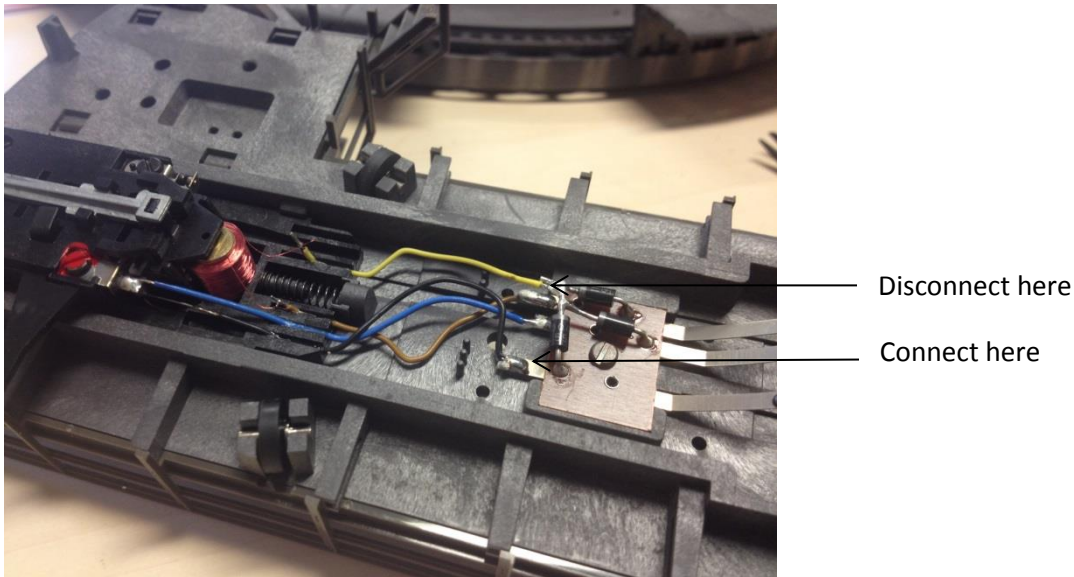


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3-rail turntable with 6 wires - terminals from left to right:

- Green : Motor
- Red : Common
- Blue : Locking mechanism
- Brown : track power (rail - Mass)
- Orange : track power (rail - S88 feedback)
- Yellow : track power (point contacts - loop)

In the 3-rail bridge of the Märklin turntable) there are three diodes. For correct operation with the DTC, the yellow wire must be connected to the black wire.



Turntable power (P12)

The motor and the locking mechanism in the bridge must be powered with 14-16 volts DC. The arrow in the picture points to pin 1.

- Pin 1 : PLUS
- Pin 2 : MINUS (GND)
- Pin 3 :
- Pin 4 :

Warning! Although the user manual of the Fleischmann / Märklin turntable indicates that a DC or AC voltage can be used, only a DC voltage may be applied when using the DTC. An AC voltage on P12 will cause permanent damage to the DTC!

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HF Generator (P6)

When using a block system connect a high frequency voltage for permanent lights in parked locomotives (hardware not yet available).

Block outputs for sidings (P8)

In case of a block system an output of a block module (like the Dinamo TM44) is connected here.

Terminals from top to bottom:

B1 : Feedback 1 in rail
B2 : Feedback 2 in rail
A : Rail

Sidings (P10)

In a block system, the sidings are connected to P10. One track at a time is powered with a relay.

	Rail A	Feedback B1	Feedback B2
Siding 1 :	pin 1	pin 14	pin 9
Siding 2 :	pin 2	pin 15	pin 22
Siding 3 :	pin 3	pin 16	pin 10
Siding 4 :	pin 4	pin 17	pin 23
Siding 5 :	pin 5	pin 18	pin 11
Siding 6 :	pin 6	pin 19	pin 24

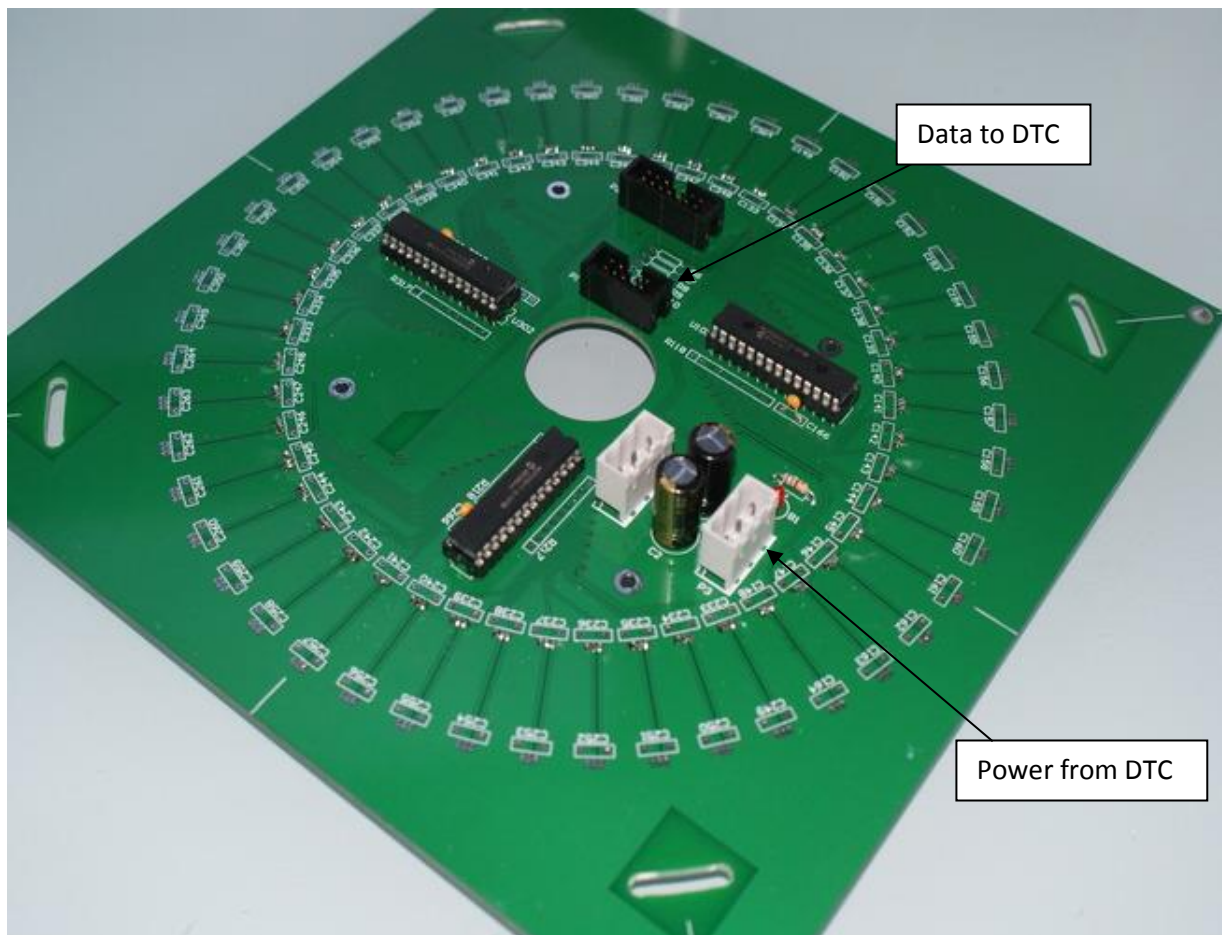
Instead of a subD connector a DinaSys DDS module can be connected to P10. The DDS module has screw terminals to connect the wires to the blocks.



DDS module

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Connections DTS



Connections on DTS module

Data to DTC

With a 10 wire flat cable, the data connection between the DTS and DTC is made.

Power from DTC

Power cable to connect to the DTC module.

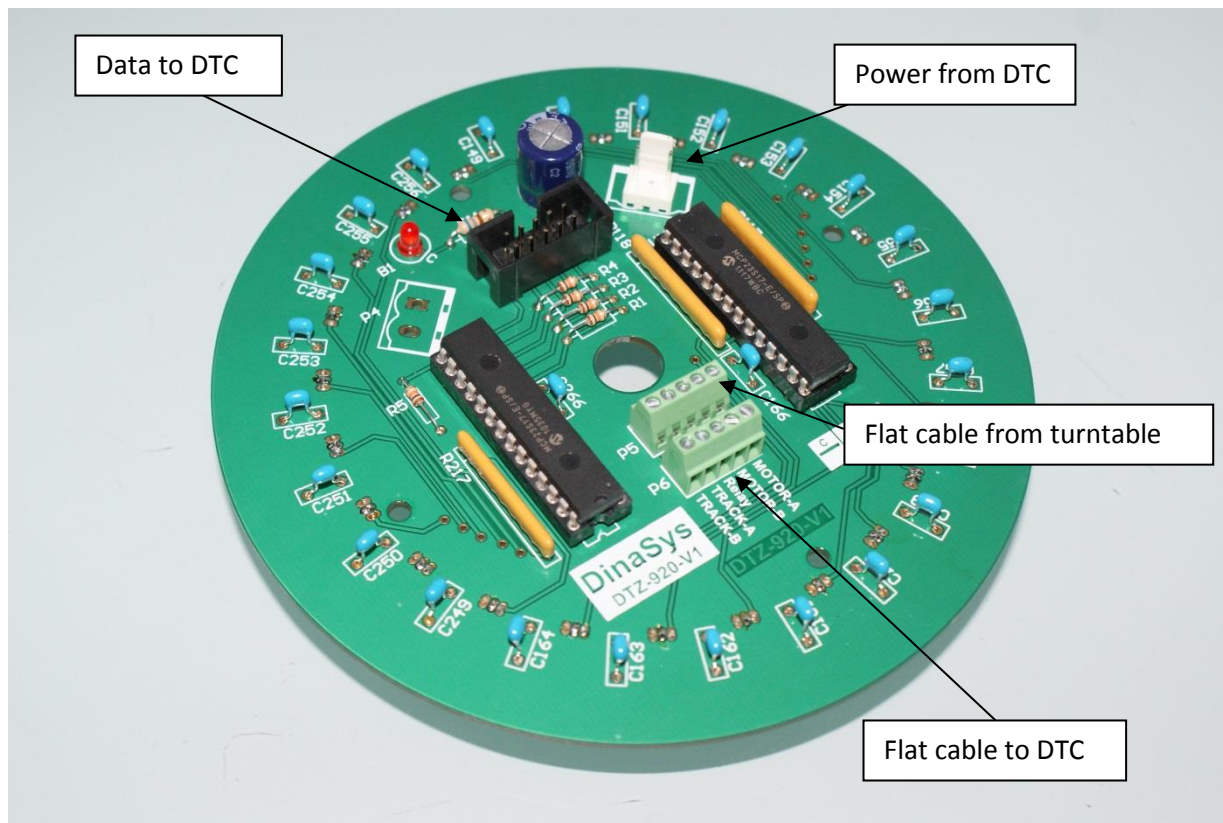
Pin 1 : +5V

Pin 2 :

Pin 3 : MINUS (GND)

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Connections DTZ



Connections on DTZ module

Data to DTC

With a 10 wire flat cable, the data connection between the DTZ and DTC is made.

Power from DTC

Power cable to connect to the DTC module.

Pin 1 : +5V

Pin 2 :

Pin 3 : MINUS (GND)

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Jumpers, LEDs and push buttons

Jumpers

The CAN-bus can be terminated with JP1.

- JP1: 1-2 Terminator aktive

AC or DC power on P11 must be selected by setting JP2.

- JP2: 1-2 AC power on Pin 1 and 2 of P11
- JP2: 2-3 DC power on Pin 3 and 4 of P11

The DTC has either 5 volt or 12 volt relays.

- JP3: 1-2 for 5 volt Relays
- JP3: 2-3 for 12 volt relays

LEDs

Three LEDs indicate the status of the DTC

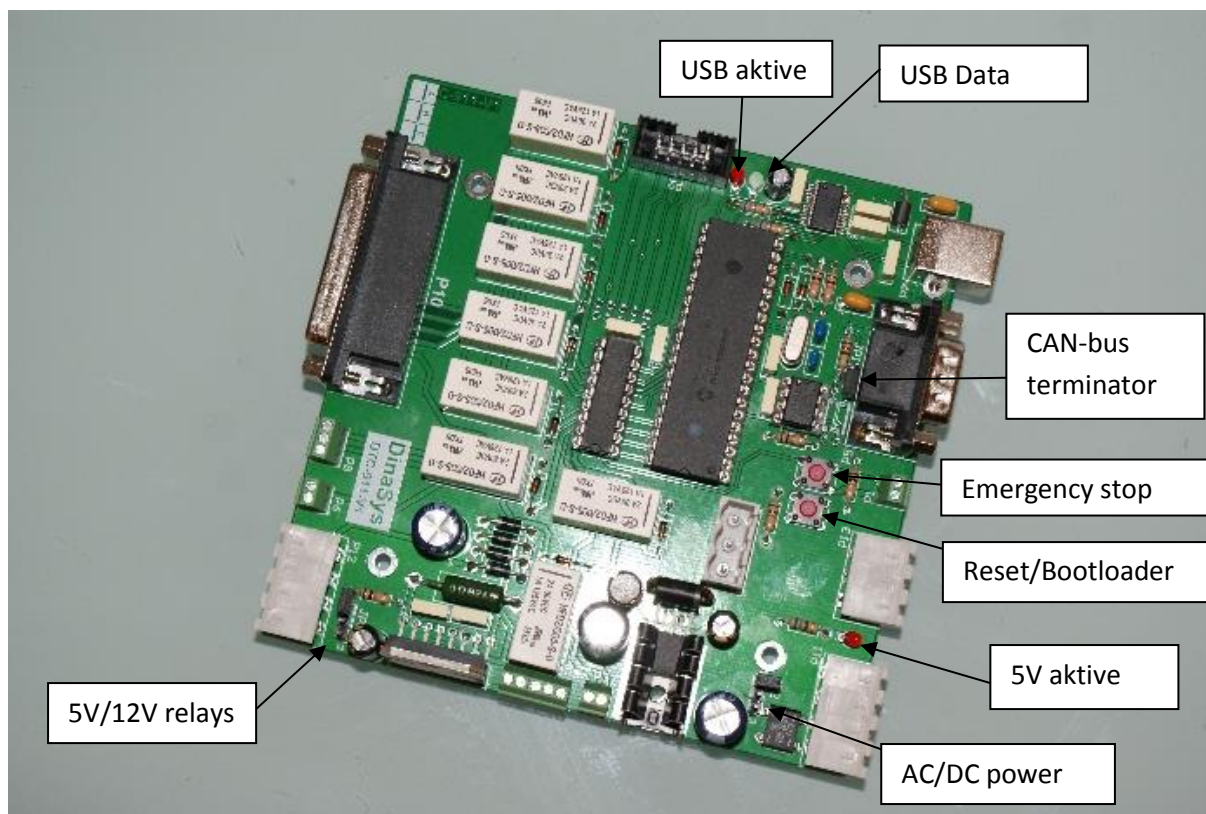
- L1: Power
- L2: USB Data aktive
- L3: USB detected

Push buttons

There are two buttons on the DTC: one for reset and bootloader and one for the emergency stop. The emergency stop is for halting the bridge, not the locomotive!

- S1: Emergency stop
- S2: Reset/Bootloader

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Jumpers, LEDs and push buttons on the DTC

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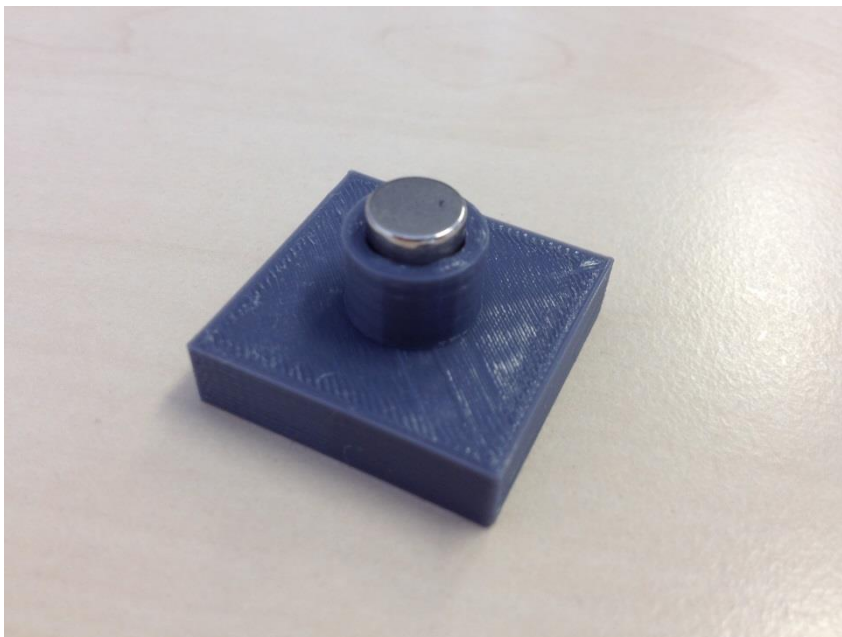
Mounting the DTC/DTS

The installation covers the following steps:

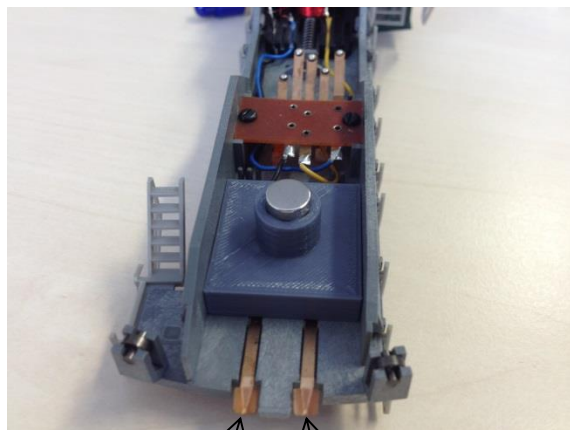
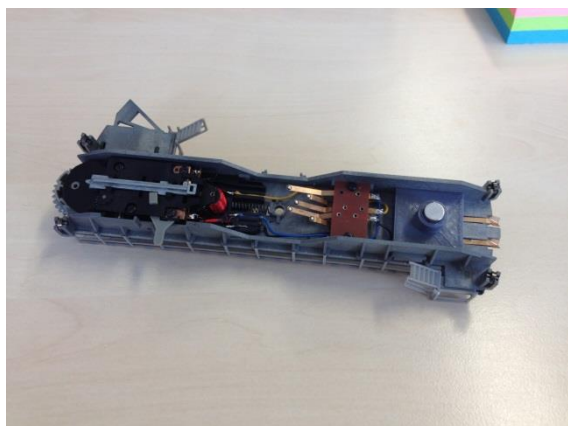
1. Stick magnet under the bridge;
2. Mount the DTC on the DTS;
3. Install the mounting bracket on the DTS;
4. Saw the hole for the turntable in the board;
5. Mount the DTC/DTS with mounting bracket to the board;
6. Lower turntable in the hole in the board;
7. Connect the cable;
8. Install the software;
9. Set properties with DTC Config.

Stick magnet under the bridge

The bridge has to be removed from the turntable (see user manual Fleischmann/Märklin). The magnet is inserted into the magnet holder (note the polarity of the magnet) and glued under the bridge. The magnet holder is not included in the set, but must be ordered separately, because the dimensions depend on the type of the turntable.



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Remove sliding contacts

The magnet holder must be mounted opposite to the machine house on the bridge. The distance (heart to heart) measured from the center of the bridge is for scale N, TT, H0, H0m and the small H0 turntable 75 mm, and for the full size H0 turntable 100 mm.

In order to ensure a slow rotation, we recommend to remove the sliding contacts under the rails.

If you want to optimize the turning of the bridge even further (even slower, but more particularly less noisy), you can eventually replace the original motor with a Maxon Motor (item number 57010001 in the PiCommIT webshop).

DTC mounted on the DTS

The DTC is mounted with spacers on the DTS. If there is not enough free space below the turntable with mounted DTS, the DTC can also be mounted next to the turntable. It is important not to extend the flat cable between DTC and DTS too much (30cm maximum).

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Saw hole in the board

The user manual of the turntable indicate the measures of the hole to be sawn in the board.

Screw the DTC/DTS with mounting bracket under the board

The assembled DTC/DTS and mounting bracket is mounted with 6 screws under the board. One must center the DTS exactly with the hole in the board.

Can reduce hub in the hole

Position the hub in such a way that the connections of the sidings match the track plan.

Then adjust the height of the DTS by turning the wing nuts until the DTS almost touches the bottom of the turntable.

The sensors must be aligned to the tracks. By loosening the four screws you can turn the DTS to 15 °.

Connecting cable

The following connections must be made:

- Flat cable from turntable (P9)
- Power cable for electronics (P11)
- Power cable for the motor and locking mechanism (P12)
- USB cable for PC (P7)
- Digital signal on screw terminals (P3)
- For block systems only: Block output for power to rail (P8)
- For block systems only: sidings at SUBD25 (P10) or DDS module

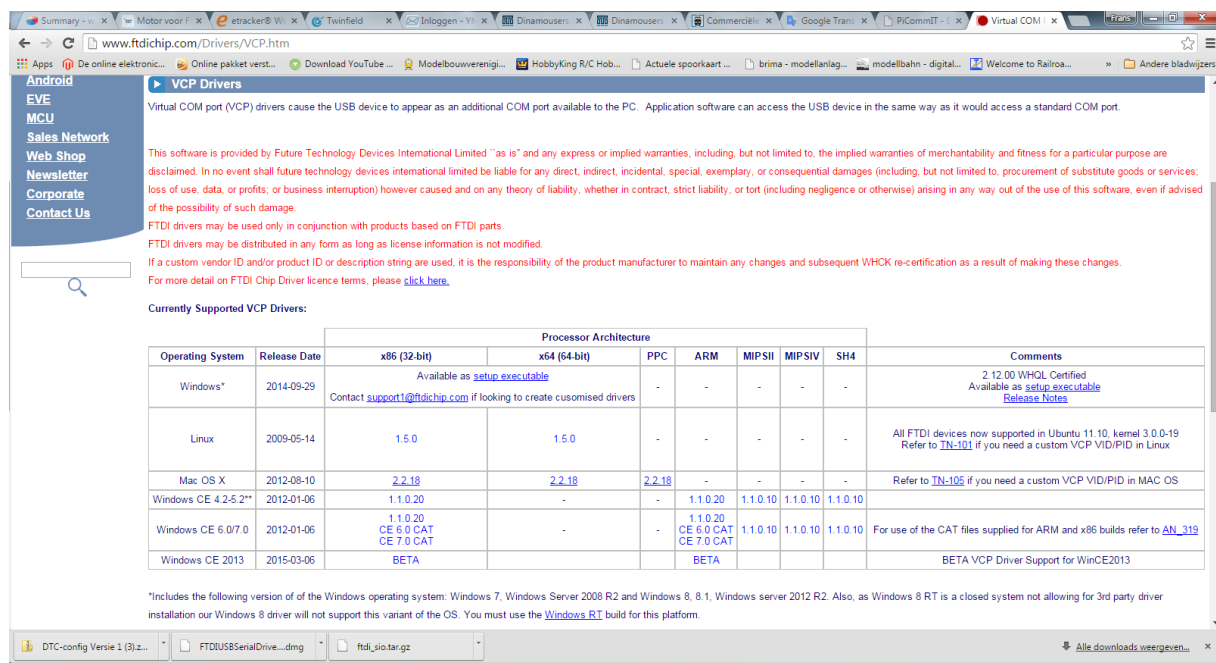
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Software drivers

The DTC uses the FTDI USB chip to communicate with the PC. The communication is done via a COM-port and uses a driver. These drivers are available for Windows, Linux and Mac OS X.

If you installed this driver already for another application, you can ignore the following step.

Browse to: <http://www.ftdichip.com/Drivers/VCP.htm> and select the appropriate driver for your operating system.



VCP Drivers

Virtual COM port (VCP) drivers cause the USB device to appear as an additional COM port available to the PC. Application software can access the USB device in the same way as it would access a standard COM port.

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FTDI drivers may be used only in conjunction with products based on FTDI parts.

FTDI drivers may be distributed in any form as long as license information is not modified.

If a custom vendor ID and/or product ID or description string are used, it is the responsibility of the product manufacturer to maintain any changes and subsequent WHCK re-certification as a result of making these changes.

For more detail on FTDI Chip Driver licence terms, please [click here](#).

Currently Supported VCP Drivers:

Operating System	Release Date	Processor Architecture								Comments
		x86 (32-bit)	x64 (64-bit)	PPC	ARM	MIPSII	MIPSIV	SH4		
Windows*	2014-09-29	Available as setup executable Contact support1@ftdichip.com if looking to create customised drivers		-	-	-	-	-	2 12 00 WHQL Certified Available as setup executable Release Notes	
Linux	2009-05-14	1.5.0	1.5.0	-	-	-	-	-	All FTDI devices now supported in Ubuntu 11.10, kernel 3.0.0-19 Refer to TN-101 if you need a custom VCP VID/PID in Linux	
Mac OS X	2012-08-10	2.2.18	2.2.18	2.2.18	-	-	-	-	Refer to TN-105 if you need a custom VCP VID/PID in MAC OS	
Windows CE 4.2-5.2**	2012-01-06	1.1.0.20	-	-	1.1.0.20	1.1.0.10	1.1.0.10	1.1.0.10		
Windows CE 6.0/7.0	2012-01-06	1.1.0.20 CE 6.0 CAT CE 7.0 CAT	-	-	1.1.0.20 CE 6.0 CAT CE 7.0 CAT	1.1.0.10	1.1.0.10	1.1.0.10	For use of the CAT files supplied for ARM and x86 builds refer to AN_319	
Windows CE 2013	2015-03-06	BETA	-	-	BETA	-	-	-	BETA VCP Driver Support for WinCE2013	

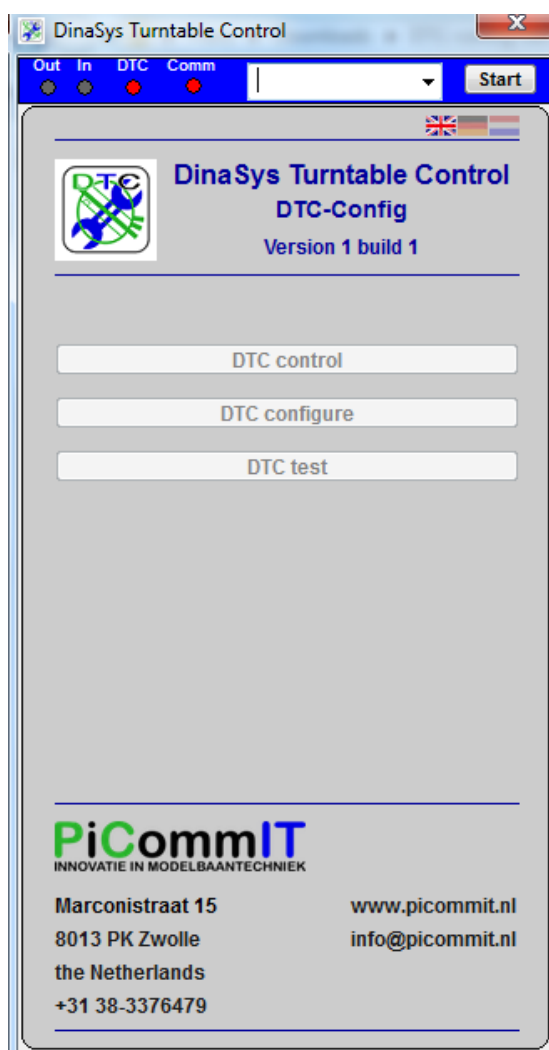
*Includes the following version of the Windows operating system: Windows 7, Windows Server 2008 R2 and Windows 8, 8.1, Windows server 2012 R2. Also, as Windows 8 RT is a closed system not allowing for 3rd party driver installation our Windows 8 driver will not support this variant of the OS. You must use the [Windows RT](#) build for this platform.

Downloads: DTC-config Versie 1 (3) z..., FTDSUSBSerialDrive...dmg, ftdi_sio.tar.gz

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Setting properties with DTC-Config

All features and the behavior of the turntable is stored in the processor on the DTC. With the DTC-Config program, you can set the properties and test the turntable. DTC-Config can be downloaded from <http://www.picommit.nl/downloads.html> and is available for Windows, Linux and Mac OS X.



This window shows the three functions: control, config and test. Choose the COM-port to which the DTC is connected in the blue bar and click Start. The red "lights" DTC and Comm turn green once the connection is established. Then click on "DTC configure".

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Change settings

This window displays the values as stored in the DTC. They can be changed and written into the DTC's processor.

The screenshot shows a software window titled "DTC configure". It has a blue header bar. Below the header, there is a section for "DTC software version" with a text input field. Below this are two buttons: "Read values" and "Write values in DTC". The main area of the window is divided into two sections. The top section contains seven settings, each with a slider and a numerical value in a box: "Minimum speed" (50%), "Maximum speed" (50%), "Acceleration/deceleration" (0.3s), "Positions deceleration" (3), "Speed correction at target" (0%), "Kickstart speed" (50%), and "Kickstart duration" (1.0s). The bottom section contains five settings, each with a slider and a numerical value in a box: "Delay at start" (0.0s), "Bell duration" (0.0s), "Sensor emergency delay" (12.7s), "Delay at end" (5.0s), and "Delay bridge voltage" (5.0s). The "Frequency PWM" setting is present but has no slider or value box.

Setting	Value
DTC software version	
Read values	
Write values in DTC	
Minimum speed	50%
Maximum speed	50%
Acceleration/deceleration	0.3s
Positions deceleration	3
Speed correction at target	0%
Kickstart speed	50%
Kickstart duration	1.0s
Frequency PWM	
Delay at start	0.0s
Bell duration	0.0s
Sensor emergency delay	12.7s
Delay at end	5.0s
Delay bridge voltage	5.0s

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Explanation of parameters

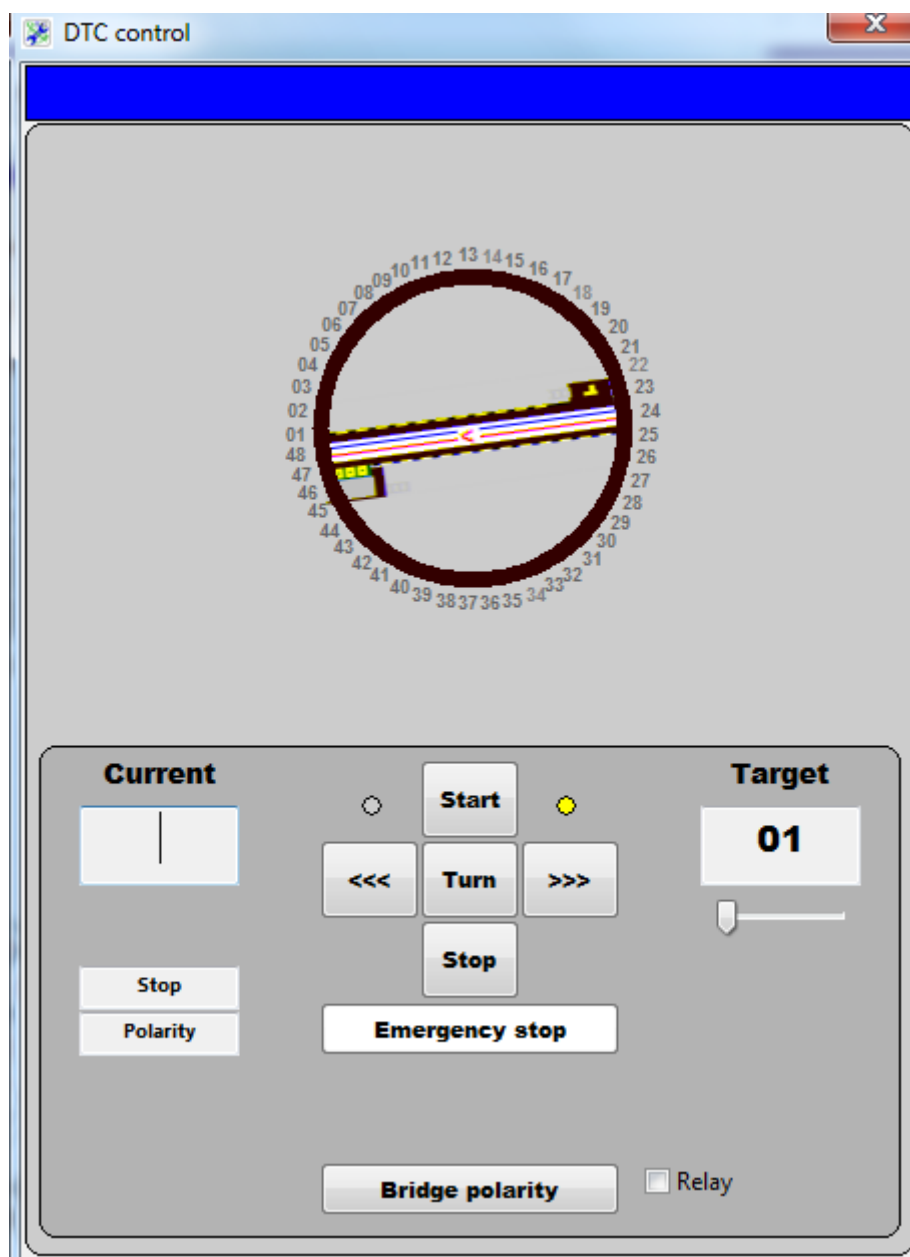
Minimum speed	Slowest turning speed
Maximum speed	Fastest turning speed
Acceleration/Deceleration	Delayed increase and decrease of speed
Positions deceleration	Number of sidings to start decreasing speed
Speed correction at target	Adjustment of speed at target track
Kickstart speed	Increased power when starting of motor
Kickstart duration	Duration of kickstart
Frequency PWM	Frequency of pulse width modulation
Delay at start	Delay before turning bridge
Bell duration	Duration of warning signal before turning
Sensor emergency delay	Maximum time between sensors before emergency stop is activated
Delay at end	Delay until the DTC reports arrival at target track
Delay bridge power	Delay until the bridge power is switched off

After changing these values, click on "Write values in DTC". Now the new setting can be tested.

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DTC operate

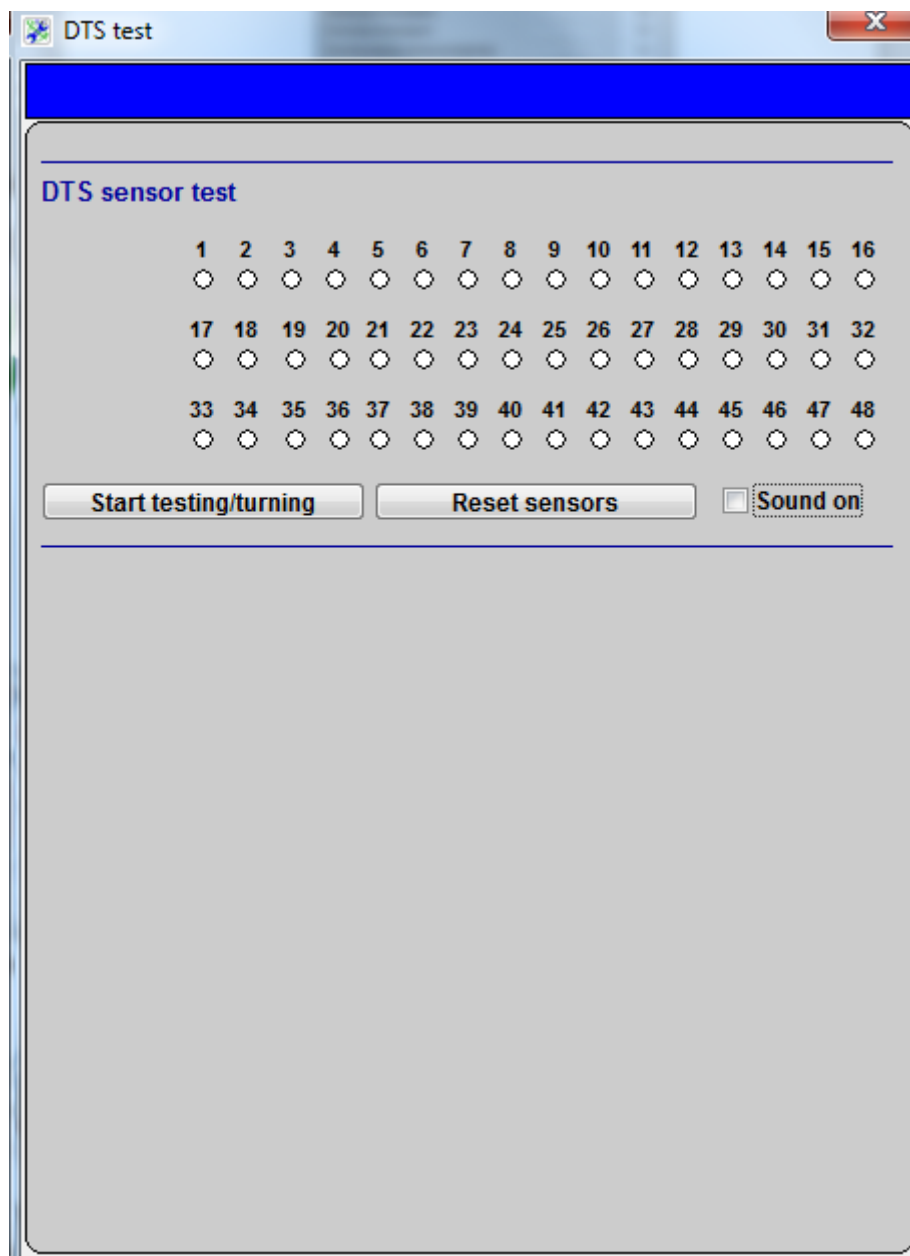
In this window, you can control the turntable. Choose a target track and click "Start". In the "Current" field the current track is displayed. The yellow balls indicate the direction of rotation, can they change with "<<<" and ">>>". "Go" is a 180 ° turn, "Stop" is normal halt and with the "emergency stop" the turning is halted without deceleration delay.



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DTS test

In this window the sensors can be tested by turning the bridge.



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Normal operation

The turntable can be controlled in different ways. Of course you can use DTC-config, but a PC-based program is recommended for an automated layout.

The DTC is supported by:

- iTrain
- WinDigipet
- Rocrail
- Train Controller
- Koploper (with DinaSys DTK adapter)

Please refer to the user manual of each program for setting up and control.

If no PC-control is desired, you can use the DinaSys DTM manual control.

